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# THE UNITED STATES OF AMERICA

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**UNITED STATES DEPARTMENT OF COMMERCE**

**United States Patent and Trademark Office**

**February 02, 2005**

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**APPLICATION NUMBER: 60/541,080**

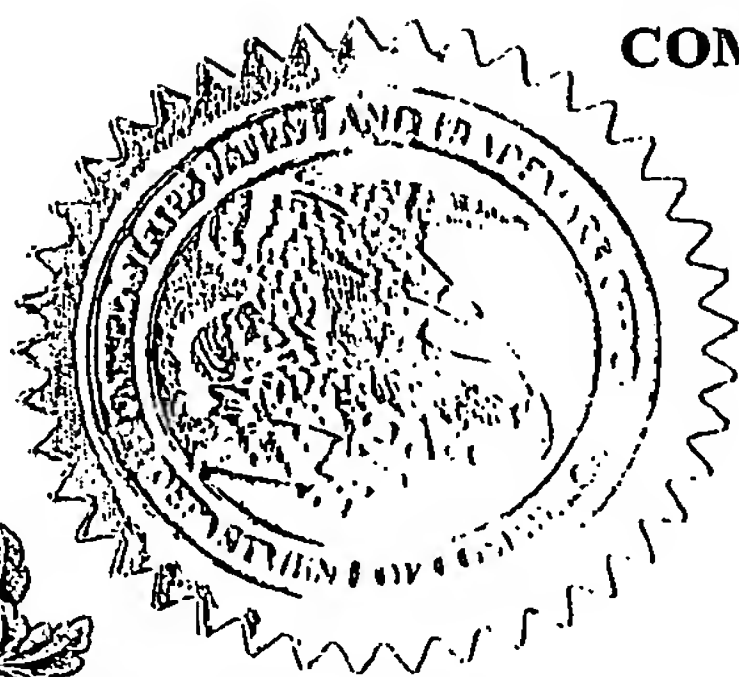
**FILING DATE: February 02, 2004**

*IB/OS/50401*

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This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53 (c).

Express Mail Label N : EV 312 068 343

Date of Deposit: February 2, 2004

INVENTOR(S)					
Given Name (first and middle [if any])		Family Name or Surname		Residence (City and either State or Foreign Country)	
JAVIER SAI SHANKAR		DEL PRADO NANDAGOPALAN		OSSINING, NEW YORK TARRYTOWN, NEW YORK	
<input type="checkbox"/> Additional inventors are being named on the _____ separately numbered sheets attached hereto					
TITLE OF THE INVENTION (280 characters max)					
ENHANCED NAV MECHANISM FOR OPTIMAL REUSE OF THE SPECTRUM					
CORRESPONDENCE ADDRESS					
Direct all correspondence to:					
<input checked="" type="checkbox"/> Customer Number 24737 → <div style="border: 1px solid black; padding: 5px; display: inline-block;">24737</div>					
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Address		345 SCARBOROUGH ROAD			
City		BRIARCLIFF MANOR		State	NEW YORK
Country		USA		ZIP	10510-8001
		Telephone	(914) 333-9608	Fax	(914) 332-0615
ENCLOSED APPLICATION PARTS (check all that apply)					
<input checked="" type="checkbox"/> Specification Number of Pages		4		<input type="checkbox"/> CD(s), Number	
<input type="checkbox"/> Drawing(s) Number of Sheets				<input type="checkbox"/> Other (specify)	
<input type="checkbox"/> Application Data Sheet. See 37 CFR 1.76					
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT (check one)					
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.					
<input type="checkbox"/> A check or money order is enclosed to cover the filing fees					
<input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number: 14-1270					
Payment by credit card. Form PTO-2038 is attached.					
FILING FEE AMOUNT (\$) 160.00					
The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.					
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Respectfully submitted,

SIGNATURE

Date FEBRUARY 2, 2004

TYPED or PRINTED NAME

Aaron Waxler

REGISTRATION NO.: 48,027

(if appropriate)

Docket Number: US040107

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This collection of information is required by 37 CFR 1.51. The information is used by the public to file (and by the PTO to process) a provisional application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the complete provisional application to the PTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Box Provisional Application, Assistant Commissioner for Patents, Box 1450, Alexandria, VA 22313-1450

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#### Detailed description of your invention:

Please describe your invention in terms of what is already known, the measures/features of your invention and the resulting advantages. The following scheme may be useful.

- Give some background information in the field of your invention, i.e. state of the art, such as commonly known facts, devices etc. If possible, state references to public documents, such as articles in technical journals, proceedings of conferences, brochures, or patent documents.
- Indicate problems/disadvantages with the state of the art that your invention will overcome. Are the disadvantages/problems new or were they already known?
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- d. Provide at least one embodiment of the invention, where you explain the best way of carrying out the invention. Please add drawings, graphs, test data etc. where appropriate.
- e. Indicate in which fields (technical, commercial) the invention can be applied.

## Enhanced NAV mechanism for optimal reuse of the spectrum

### Prior Art and Problem Statement

The IEEE 802.11-99 Standard defines the following NAV protection mechanism:

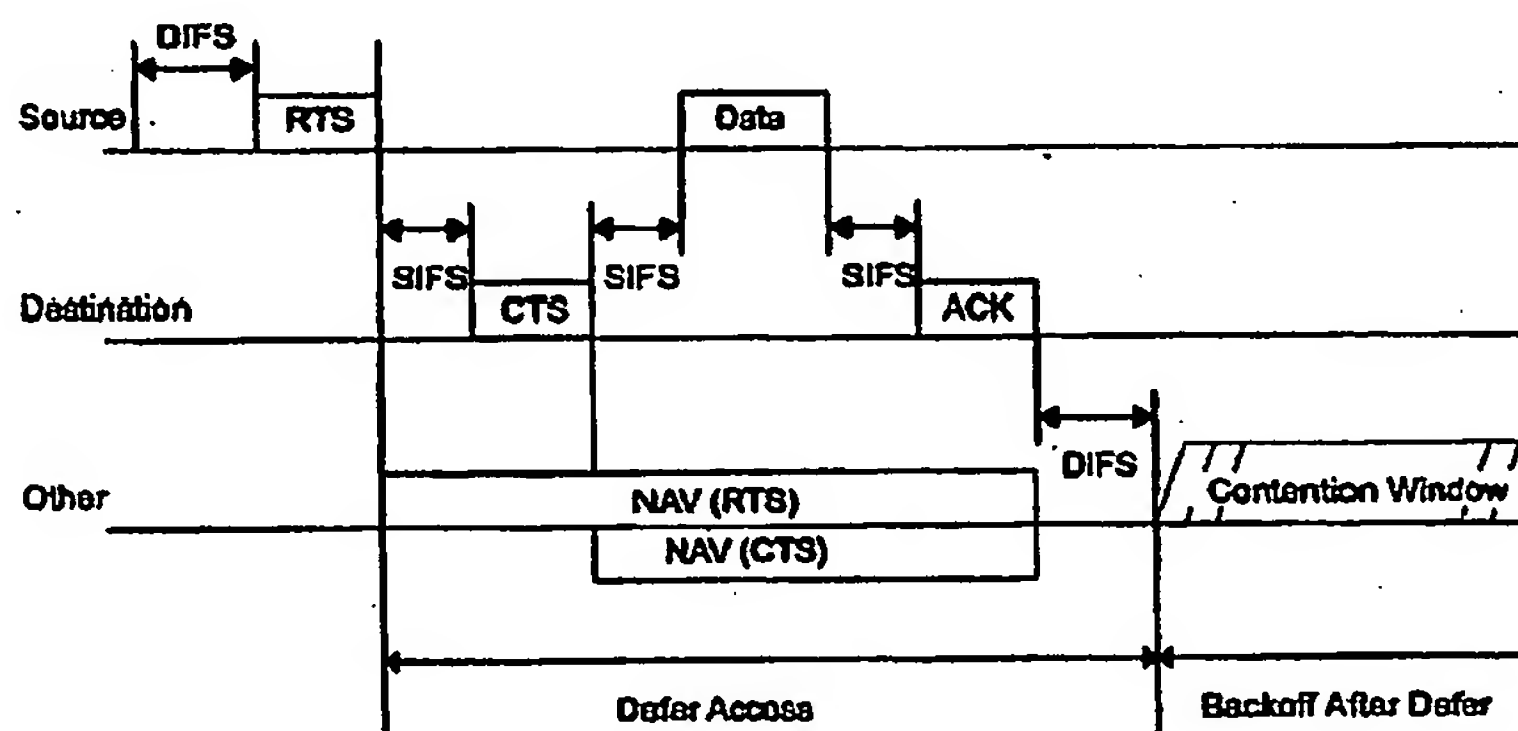


Figure 57—RTS/CTS/data/ACK and NAV setting

The medium is reserved during both transmission and reception of frames, although reservation is only needed when frames need to be received.

### Invention

In this invention we propose a new use of the NAV mechanism that allows for an optimal reuse of the spectrum. Basically, when a station is transmitting some data, the neighbours of such station can also transmit frames, because the collisions can only occur at the receiver station. The reservation of the medium needs only to be done exactly when a frame is expected to be received, that is, neighbours of a receiver, need to be quite at that time, so that the receiver can decode a frame. This is shown in the following figure:

When normal ACK policy is used:

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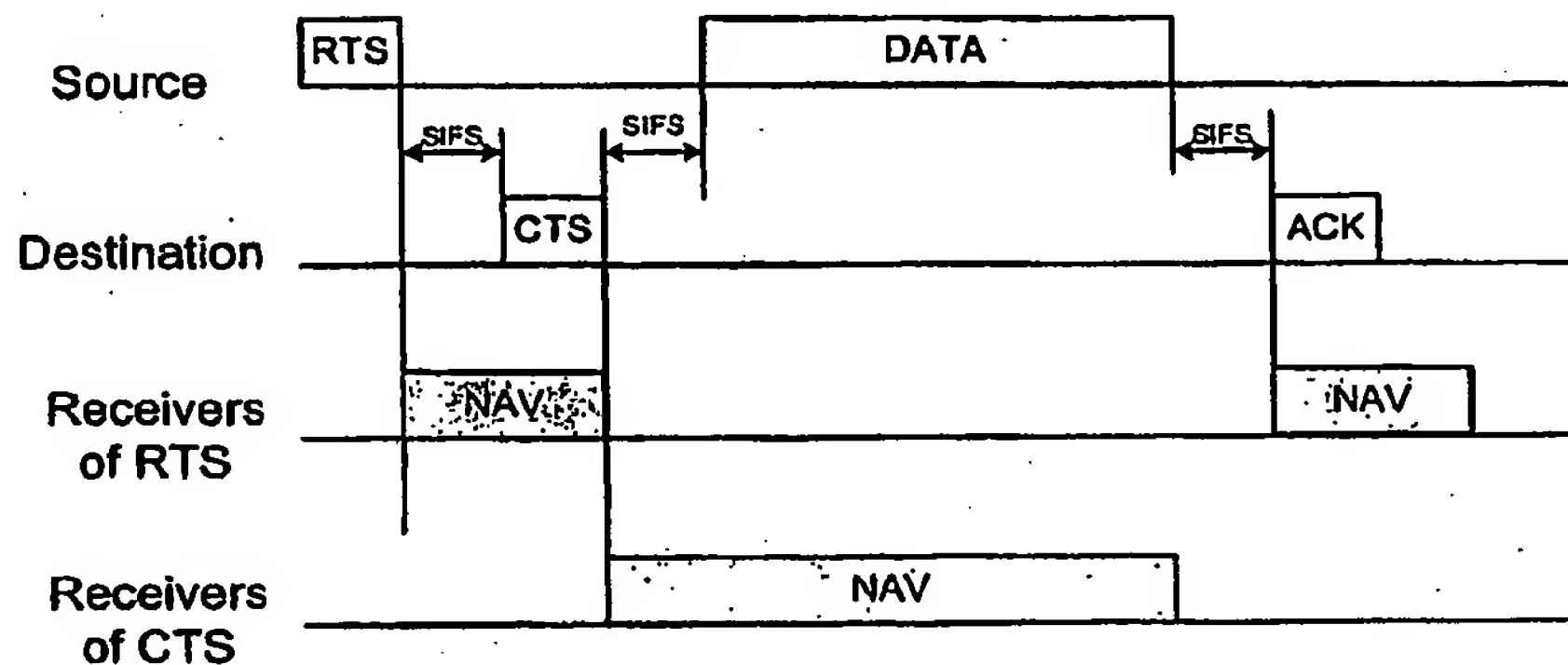


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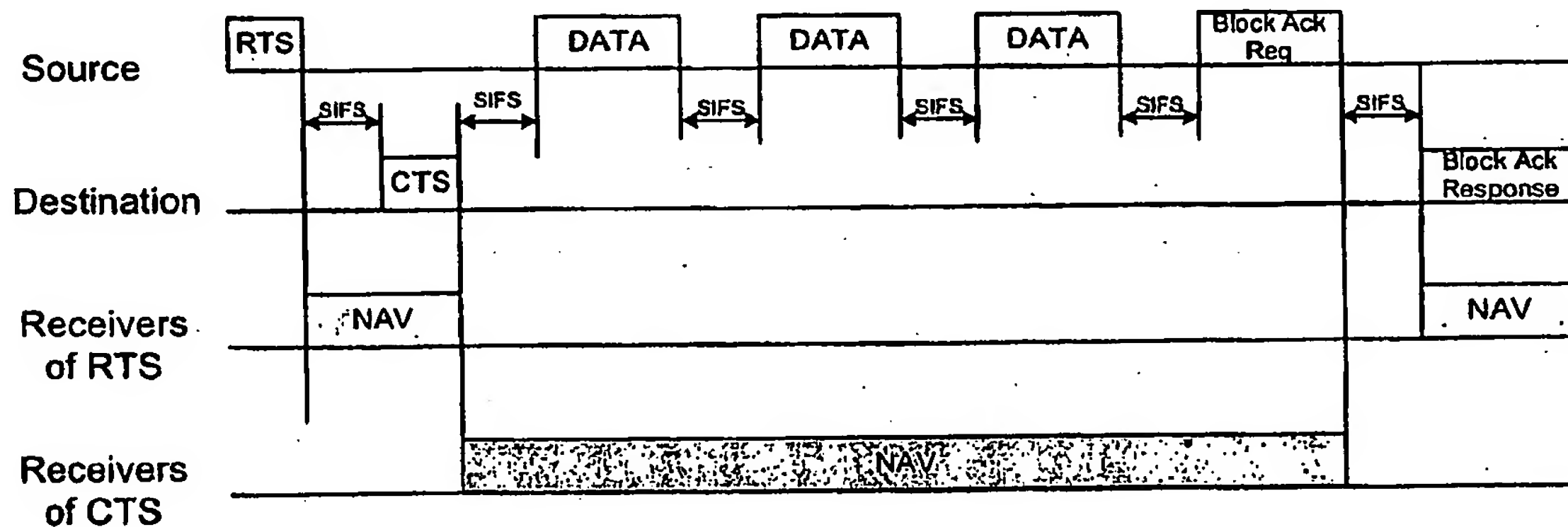
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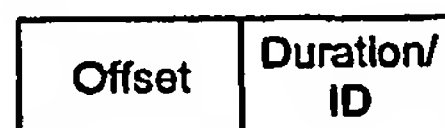
This mechanism becomes very efficient when burst ACK or No ACK policies from the IEEE 802.11e draft are used in combination with the TXOP bursting:

For example:



Receivers of RTS (which did not receive the CTS) can use the medium while the Source is sending Data, since they will not interfere with the recipient of the Data Frames (i.e., the sender of the CTS)

This is achieved by modifying the current Frame Format. We just add a new Offset Field before the Duration/ID value:



The Offset field specifies the time between the end of the reception of the frame and the time when the NAV shall be set

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Traditional reservation method can still be used with Offset = 0

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